

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
23 February 2006 (23.02.2006)

PCT

(10) International Publication Number  
**WO 2006/020827 A3**

(51) International Patent Classification:

E21B 23/08 (2006.01) E21B 43/10 (2006.01)  
E21B 43/08 (2006.01) E21B 29/00 (2006.01)

(21) International Application Number:

PCT/US2005/028669

(22) International Filing Date: 11 August 2005 (11.08.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/600,679 11 August 2004 (11.08.2004) US

(71) Applicants and

(72) Inventors: **BRISCO, David, Paul** [US/US]; 405 Westridge Drive, Duncan, OK 73533 (US). **WATSON, Brock, Wayne** [US/US]; 2535 Marsh Lane, # 1004, Carrollton, TX 75006 (US). **SHUSTER, Mark** [US/US]; 19115 Prospect Lane, Houston, TX 77094 (US). **GRAY, Malcolm** [US/US]; 1502 Wagon Gap Trail, Houston, TX 77010 (US). **GRINBERG, Grigoriy** [US/US]; 4758 Mount Airy, Sylvania, OH 43560 (US). **COSTA, Scott** [US/US]; 25614 Broadcrest Court, Katy, TX 77494 (US). **WASSON, Russell** [US/US]; 2647 Highway J, Bourbon, MO 65441 (US).

(74) Agents: **HAYNES AND BOONE LLP** et al.; 901 Main Street, Suite 3100, Dallas, TX 75202 (US).

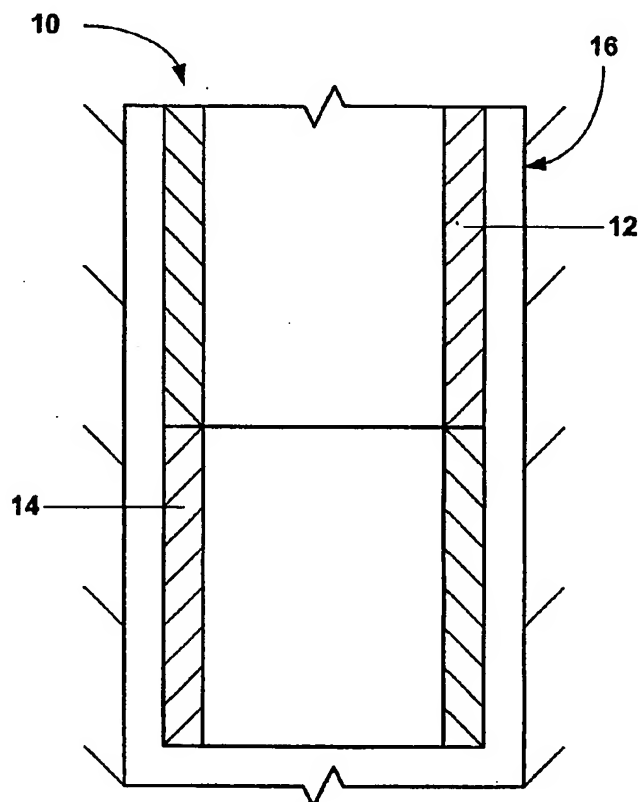
(71) Applicant (for all designated States except US): **EN-VENTURE GLOBAL TECHNOLOGY, LLC** [US/US]; 16200 A Park Row, Houston, TX 77084 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,

[Continued on next page]

(54) Title: HYDROFORMING METHOD AND APPARATUS

(57) Abstract: A hydroforming method and apparatus.



WO 2006/020827 A3



GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declaration under Rule 4.17:**

— of inventorship (Rule 4.17(iv))

**Published:**

— with international search report  
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:

15 June 2006

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/28669

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>IPC: E21B 23/08( 2006.01), 43/08( 2006.01), 43/10( 2006.01)<br>E21B 29/00( 2006.01)<br><br>USPC: 166/206, 207, 212<br>According to International Patent Classification (IPC) or to both national classification and IPC  |  |   |  |  |
|--|--|---|--|--|
| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br>U.S. : 166/206, 207, 209, 212, 216, 217, 277<br><br>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br><br>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br>East  |  |   |  |  |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>  |  |   |  |  |
| Category *   | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No.   |  |  |
| A  | US 3,948,321 A (Owen et al.) 06 April 1976 (06.04.1976), see entire document.  | 1 and 8   |  |  |
| X  | US 5,348,095 A (Worrall et al.) 20 September 1994 (20.09.1994), see entire document.   |   |  |  |
| A  | US 6,012,523 A (Campbell et al.) 11 January 2000 (11.01.2000) see entire document.   |   |  |  |
| A  | US 6,142,230 A (Smalley et al.) 7 November 2000 (07.11.2000), see entire document.   |   |  |  |
| <input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.  |  |   |  |  |
| <table border="0"> <tr> <td>           * Special categories of cited documents:<br/>           "A" document defining the general state of the art which is not considered to be of particular relevance<br/>           "B" earlier application or patent published on or after the international filing date<br/>           "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br/>           "O" document referring to an oral disclosure, use, exhibition or other means<br/>           "P" document published prior to the international filing date but later than the priority date claimed         </td> <td>           "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br/>           "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br/>           "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br/>           "&amp;" document member of the same patent family         </td> </tr> </table> |  |   | * Special categories of cited documents:<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"B" earlier application or patent published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br>"&" document member of the same patent family |
| * Special categories of cited documents:<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"B" earlier application or patent published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed   | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br>"&" document member of the same patent family |   |  |  |
| Date of the actual completion of the international search<br>03 March 2006 (03.03.2006)  |  | Date of mailing of the international search report<br>17 APR 2006   |  |  |
| Name and mailing address of the ISA/US<br>Mail Stop PCT, Attn: ISA/US<br>Commissioner for Patents<br>P.O. Box 1450<br>Alexandria, Virginia 22313-1450<br>Facsimile No. (571) 273-3201  |  | Authorized officer<br>David J Bagnell<br>Telephone No. 703 308-2168 |  |  |